"INGIDENCE, BAGTERIOLOGY AND SCORING OF POST-OPERATIVE WOUND SEPSIS".

THESIS FOR MASTER OF SURGERY (GENERAL SURGERY)





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"INCIDINGE, BACTERIOLOGY AND SCORING OF POST-OFFRATIVE NOUND SEPSIS", which is being submitted as Thesis for M.S. (General Surgery) Examination 1992 of Sundelkhand University, Jhansi, has been carried out by Dr. Neeta Sebgal herself in this Department.

She has put in the necessary stay in the department as required by the regulation of Sund-Ikhand University.

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entitled "INCIDINCY, BACTERIOLOGY AND SCORING OF POST-OFFRATIVE WOUND SEPSIS", which is being submitted as Thesis for M.S. (General Surgery) Examination 1992, has been carried out by Dr. Neets Sehgal, under my constant supervision and guidance. The results and observations were checked and verified by me from time to time. The techniques embodied in this work were undertaken by the candidate herself.

This work fulfils the basic ordinance governing the submission of thesis laid down by Bundelkhand University.

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Her results and observations have been checked and verified by me from time to time.

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ACKNOWN DOWNER

Expressing one's emotions are even at the best of times, a difficult exercise especially when we are trying to acknowledge the contribution of our revered teachers and colleagues.

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Dated : /0 Mag. 1991.

(NEETA SENGAL)

CONTRNS

INTRODUCTION	* * *	* **	* * *	**	1 - 4
RIVITY OF LITTRATUR	* • •	***	* * *	***	5 - 31
MATERIAL AND METHOD)	學 接 衛	* * *	· · · · · · · · · · · · · · · · · · ·	32 - 36
OBSTRVATIONS	等 装 等	***	***	***	37 - 51
DISCUSSION	** *** ***	***	***	等者参	52 - 58
CONCLUSION	***	• • •	**	***	39 - 60
BIBLIOGRAPHY	***	* * *	***	**	I - VIII
SUMMARY (I	N STPARA		OVTR)		

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INTRODUCTION

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INTRODUCTION

Infection is a dynamic process involving invasion of the body by pethogenic micro organism and reaction of the tissues to organisms and their toxins. Soon after birth, a variety of micro organisms colonise the external and internal surface of human body. This indigenous microflors usually does no harm, it produces no detectable pathological effects in tissues and even may be heneficial. Infection evolves into overt disease only when the equilibrium between host and parasite is upset. Of the thousands of species of micro organisms in nature, only few hundred are known to be pathogenic for human beings.

Current thinking concerning clinical disease resulting from host and parasive inter-relationships recognises the role of general health of the host, the previous contact with micro-organisms, the past clinical history and various insults (toxic, traumatic and therapeutic) of non-microbial origin.

Despite more than 80 years of aseptic surgery and more than 40 years of experience with anti-microbial agents, the surgeons finds that infections are as great problem now as in the past. But the etiplogic agents have changed,

Streptococci and pneumococci are no longer the captains of death because they can be controlled by antibiotics.

Staphylococci continue to cause nosocomial (hospital acquired) infections, but those gram megative bacteria usually considered non-pathogens opportunists or secondary invaders have become a major problem. Mosocomial infections result from transmission of pathogens to a previously uninfected patient from a source in the hospital environment (cross infection). Alternatively the pathogens may come from patients themselves (auto-infections). They may be carriers of the pathogens or become colonized with virulent hospital strains during hospitelization. Many nosocomial infections have latrogenic besis. Frequent or prolonged use of aupportive procedures such as indwelling vascular or urinary catheters, tracheostomies, equipment for postoperative respiratory care are responsible for most istrogenic infections.

A surgical infection (42) is an infection that required surgical treatment and has developed before or as a complication of surgical treatment. Thus a post-operative wound infection is also a specific nosocomial infection. Surgical infections may be enalysed in relations to procedures in clean or contaminated field, the anatomic site or system involved and the pathophysiologic activities of the causative micro-organisms.

The micro-organisms commonly encountered in surgical infections are the staphylococci, streptococci, clostridia, bacteroids, E. coli, pseudomonas, Froteus and Klebseilla.

It is frequently said with some truth that you connot begin to investigate something until you can measure it. There is no doubt for instance that the clinical atudy of accidental trauma has greatly dependent on the various attempts to grade its severity (21, 22). You can measure severity of Head injury by classics comma scale but as far as sepsis is concerned, a convenient grading system is still lacking. Sepsis can be present in so many forms e.g. just a local wound infection or ceneralised involvement of all the systems of body. However, attempts have been made by some workers to evaluate a system for grading the severity of sepsis but the different parameters used in these system were not easily obtainable. In between these two extremes, other forms of presentation of sepsis also exists, but you can't measure them. So in this study, we have attempted to grade the sepsis by modified grading system of E.A. Elebute & M.S. Stoner (17).

AIM OF STUDY

The present study is simed at -

- 1. Finding the incidence of post-operative wound infection,
- 2. Type of bacteria involved,
- 3. Grading the severity of sepsis by modified scoring system of L.A. Elebute & H.B. Stomer (17).

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REVIEW OF LITERATURE

Innovation in the treatment of disease by surgical therapy has been apparent since the beginning of recorded history. By the time enseathesia was introduced by Martin in 1846, numerous operations were practiced. Though after anneathesia was widely used and surgeons could operate more deliberately, yet elective operations remained an unacceptable alternative for most patients with surgical disease, because almost all operative wounds become infected and almost half of all patients who had a major operation died as a result of infection. The most frequent complications of wound were errsipeles, hospital gangreme (presumably necrotizing streptococcal mixed synergistic infection), septicaemia and/or tetanus. Infection was so common in wounds that it was thought by many, an important part of the normal healing process.

Lister has been generally recognised as the discoverer of the antiseptic surgery and his paper on the "Antiseptic Frinciple in the Fractice of Surgery" published in 1867 was instrumental in revolutionising the practice of Surgery, the infection rate in elective operations dropped from 90% or more to 10% or less with application of Listerian principles (15). Lister was

guided and stimulated by the work of Pasteur on the nature of formentation and purifications and his contributions related well to the observations and work of many men such as Oliver Wendell Holmes, Ignox Semmelveis and Theoder Kocher. Even though many others preceding Lister helped pave the way, Lister's concept and techniques met with widespread disbelief during the latter part of the 19th century and were resisted. However, the superior results could not be ignored too long, and the concepts of asspais as pioneered by Semmelweise in 1847 and antisepsis as pioneered by Lister in 1867 gradually amalgamed so that aseptic antiseptic principles were almost completely developed by 1890 and have been the concept without change during 20th century.

It was these basic principles of infection control set forth primarily in the 33 years between 1867 and 1900 that really set surgery free from the bonds of despair and disappointment, changing surgical therapy from a dreaded event of infection with almost a sure death to one that now provides an enormous alleviation of suffering and prolongation of the life with close to universal success when carefully performed.

In 1955 there was a general impression that post-operative wound sepsis was becoming more common. This belief was probably based on reports of outbreaks of exceptional severity with sepsis rate between 10% and 37%.

conducted a study to give information on the incidence of wound sepsia and its cost in terms of loss of life and length of stay in hospitals in England & wales. Patients included in this study were all whose operation involved as incision through healthy skim. Operations on lower urinary tracts, rectum or anus and an accidental wounds were excluded. On the day of admission, a nose swab was taken from each patient and was cultured for staph sureus. During the post-operative period the wound was examined at the time of the first dressing. Swabs were taken from nearly all wounds at the time of first dressing.

A total of 3276 surgical operations in twenty one different hospitals were studied clinically and (in 2860) becteriologically. During convalencence, 9.7% of wounds were effected by some post-operative sepsis and yielded pathogenic becterie on culture. The sepsis rate in different hospitals undertaking general surgery varied between 4.7% 4 21.8%. The highest sepsia rate after clean operations were for cholocystectomy (21%) and breest carcinoma (15%) and lawset were for orthopsedic operations (2%).

Orestor age of the patients, length of preoperative stay is hospital, length of incision and
duration of operation were all associated with increased
sepsis rate as was the use of a drainage tube. Staph oursus

was the commonent pathogen but infection with coliform organism was also common. Masal carriers of staph surgues had only a slightly higher post-operative sepsis rate then non-cerrier 68.9% compared with 71%. Fatients whose wounds healed without sepsis left hospital on average .8 days earlier than had been predicted on the day of operation, then with sepsis and infection had an excess of 7.3 days over that predicted. 56 of the patients in the survey died, but in only 1 case was death definitely ettributed to wound sepsis.

In 1960 Lawrence 5. Cohen (13) et al studied the epidemiology of staphylococcal infection. All patients admitted to the word surgical service of The Johns Hopkins hospital between September 1960 and December 1961 were studied. A clinical infection was defined as a lesion characterized by suppuration or cellulitis and from which coaquiase positive stephylococcus sureus vas isolated predominantly or in pure culture. During this study. 8952 surgical procedures were performed, 143 post-operative staphylococcal infections were diagnosed and the infection rate was 16%, Hearly all the post-operative infections were wound infections. Three patients had infection et the sites of indwelling intravenous catheters. The highest infection rates were men after operations upon the gastrointestinal tract, gestrectomy, cholocystectomy, lysis of abdominal adhesions, drainage of abdominal abacess,

perineal resection had rates in success of 5%. Increasing age of the patient, increasing duration of operation, the use of blood transfusions, hypotension necessitating the use of vesopressor amines during operation and congestive cardiac failure were correlated with an increased infection rate. Race, sex, the need for an emergency operation, the presence of a drain post-operatively, prophylactic antibiotics, diebetes, chronic lung disease, uraemia, cancer, obesity, liver disease, steroid therapy and length of time spent in hospital before operation were not correlated with increased susceptibility in infection.

In 1962 John S.S. Stewart & D.M. Douglas (46) studied the relationship between wound sepsis and operating list order. During a period of twenty seven months, a wound register was kept in a general surgical unit. The records included information about the position of each case on the operating list, the nature and duration of each operation, the length and drainage of wounds and the state of each wound whether clean or septic. In the cases with incised wounds the duration of operation was recorded as long as if it lasted more than sixty minutes, medium if thirty to sixty minutes, or short if less than thirty minutes. Wound length was similarly recorded as long if more than 20 cms, medium if 10 - 20 cms, or short if less than leas than 10 cms. Drains were recorded if present and

these included some inserted through the main access wound and others inserted through a separate stab wound. Applysis of data was carried out in respect of several factors said to be associated with high wound sensis Fate. Wound or pais was present in 11 of 595 cases - 1.8%. There was a significantly low sepsis gate in cases placed first on the operating list. However, when combined analysis in respect of duration of operation, wound length and vound drainage was done. It showed that case first on the list were in each instance, at a disadvantage with significently longer operation, long wounds and more drain then later. There was a significantly high sepais rate of 13.8% in young children less than 1 year old. The overall position in respect of wound sepsis rates showed an increase with late positioning in operating list. The association might be the result of artefact, fatigue and operating theatre contamination. No association could be demonstrated in clean cases between sepsis rate and duration of operation. wound length or drainage or advanced ago.

In 1964, Committee on Traume (14) published a report on post-operative wound infection and the influence of u.v. irradiation of the operating room and of the various other factors. It was investigated by means of a double blind randomized study in five institutions. Over a two year period, 14,854 operations and 15,613 incisions were studied in relation to post-operative wound infection.

Although w.v. radiation reduced the number of air-borne bacteria in the operating room, the wound infection rate in the entire series following operation was 7.4% in irradiated rooms and 7.5% in non-irradiated rooms. The only category of wounds that benefited significantly from the use of w.v. radiation was the refined clean group in which post-operative infection rate was reduced from 3.8 to 2.9%. The overall infection rates at each of the five participating hospitals varied from a low of 3 to high of 11.7%. The age of the patient apparently exerts a direct influence on wound infection rate which rises steadily from 15-24 years of age-group to 65-74 years of age-group.

Diabetic patients showed no increased susceptibility to infection. The extremely obese patients appear to be more susceptible to wound infection.

In 1967, A.J. Henderson (23) conducted a study
to know the extent of staphylococcal infection of surgical
wounds. One hundred clean operations were studied over a
period of 3 years. They were all major operations e.g.
radical mastectomies (59), cholecystectomies (31) and
quetrectomies (2). The remainder 8 were miscellaneous.
Binty one of the hundred operations were drained by a
tube through a stab wound, separate from the main incision.
The operations were all performed by same Surgeons. The
patients were examined daily until either the wound had

established. Out of hundred clean major operations were studied becteriologically in an attempt to locate the source of any subsequent staphylococcal infection of wounds or drains. There were 12 cases of septic infection and 13 of non-septic infection. The majority of both of these types of infection appeared to have arises in the ward.

In 1969, awarett et al (18) conducted a prospective study to determine whether results of colonic surgery differed after preparation of the large bowel with and without antiblotics. Fatients undergoing surgery for diverticulitie, carcinome or ulcerative colitus were selected. Patients with scute obstruction were not included. All patients were divided by random selection into two groups - A & B. Petients in Group A were prepared for operation by lavage and by administration of oral necessors 1 gm. 4 hourly, those is group 8 were prepared by levege only. The operations were carried out by seven surgeons. Amostomosis were performed by all these surgeons by the open method in two layers using inner continuous QQ chromic catqut and outer interrupted silk sutures. Forty five of the 50 patients came to operation of whom 10 were judged to be in a state of incomplete obstruction peroperatively. In 39 of the operations it was possible to inspect the whole colon. No difference was noted in the quantity and quality of the bowel contents between patients

of meanycin treated group (A) & group receiving only
levage (B). In post-operative period, wound infection
generally yielded a mixed flora with E. coli predominating.
Evidences obtained that wound infection resulted from
implantation of gut organism into the neighbouring tissues
at operation. It was suggested that a reappraisal of
aseptic technique at operation might favour a great
reduction in wound sepsis in colonic surgery than preoperative administration of oral antibiotics.

The rising tempo with which amerobes were being recovered from infected patients demanded a heightened awareness of the role these organisms play in human sepsis. Prectically all amerobes infecting human tissue can be isolated from the microbial flora of the normal intestinal tract in which amerobic conditions prevail. The fact that most gram positive amerobes are sensitive to penicillin probably accounts for their rare association with significant human infections.

in 1973 Eugeme R. Hobles (19) studied besteroides infections in one hundred and twelve patients at Sepist Memorial Hospital, Mewplus. Out of 112, 43 had septiments and 69 had soft tissue infection. Median age of patients was 48 year with the range between 7 and 63. To isolate and identify anserobes they used the method of Holdeman & Moore. They routinely innoculated into thioglycollate broth all materials suspected of containing enserobes. This included

all specimens of blood, wound exudates and body cavity fluids. B. fragilis was by far the most common species recovered in 43 patients with septicaemia. These organisms were the solitary blood isolate in 37 patients, 15 of whom died. The B. fragiles again dominated in bacterial flora recovered in 69 instances of soft tissue infection. The portal of entry or primary focus of infection in the 43 desem of septicaemia was G.I.T., Urinary tract & lungs. Six of the eight patient died in whom the lung was the primery focus of infection. The 43 patients with becteroides septicaemia demonstrate the full potential of these organisms for serious, frequently lethal infections. Out of 43 patients, with positive bacteroides blood oulture, 15 died, a mortality of 35%. Disseminated, intravascular coagulation was present in 5 patients, one of whom died. Septic shock occurred in 7 patients, six of whom died.

infection from which becteroides species were cultured, often as solitary isolate. Forty nine of these infections were abscesses, five were generalized peritonitia, three were spaceases, the were generalized peritonitia, three were spaceases, the were endometrial infections, one was a decubitus ulcer and one was severe gastro-enteritis.

Of those with septicsemia who received no effective antibiotic 60% died, although only 12% died who were treated with any appropriate drug. Their antibiotic studies revealed

chloramphenicol, clindamycin and carbaenecillin to be the most effective antimicrobials.

In 1976 Asj Kumar & K.K. Mittel (39) studied the role of prophylactic antibiotics in post-operative wound infections at M.G. Institute of Medical Sciences, Wardha. A total of 698 patients admitted under a single surgeon over a period of 2 years formed the basis of study. Fatients operated for infected conditions or admitted with infected wounds have been excluded. The patients included in the study were divided into clean and potentially infected cases. The clean cases were further subdivided into two groups. In one, no antibiotics were given whereas patients in the other group received prophylactic entiblotics in the post-operative period. All dases in potentially infected group received a course of antibiotics in post operative period. A careful inspection of the operation wound was done at frequent intervals in the post operative period. Whenever there was evidence of infection, including a stitch abscess, samples were taken for bacteriological study. A total of 193 clean cases were operated without any post-operative entiblotics. 27 of these cases developed wound infection, 5 being becteriologically sterile giving an overall sepsis rate of 6.9% and a purulent infection rate of 1.51%. 195 clean cases were given prophylactic antibiotics (Penicillin and streptomycin) for a period of 5 days after operation.

Thirteen of these cases developed infection, one of which was bacteriologically sterile giving an overall sepsis rate of 6.6% and purulent sepsis rate of 6.1%. A total of 110 potentially infected cases were given a combination of penicillin and streptomycin or a broad spectrum entibiotic for a period of 5-7 days after operation. 10 of these cases do welcood wound infection, two being storile, giving an overall infection rate of 7.3%. So in this study, the overall infection rate was 7.1% and a purulent infection rate was 6%. The predominent organism grown from infected vounds in clean surgical procedures was conquiese positive staphylococus aureus, which was resistant to the commonly used antibiotics in about 25% cases. No significant difference in the infection rate has been found in clean cages treated with or without entiblotics. They concluded that in clean operative procedures unless there are specific indications it is better to administer appropriate chemotherapy after bacteriological study of the infected wound rather than routinely used prophylactic antibiotics.

Pagudomonas cerugiasse is a common isolate of surgical wound infection. Due to its resistance to commonly used entimicrobials and difficulties in its eradication from the environment because of its ability to multiply in presence of even trace amounts of nutrients end its ability to survive for long in most environment, hospital acquired infections with F, derugiasse is a

common finding in surgical wards. In 1979 Sen Gupta (41) isolated 160 samples of F.aeruginosa out of 5309 clinical samples from different clinical disciplines of general hospital at Dr. V.M. Medical College, Solapur, Maharashtra. Majority of them were from pus and urine samples referred from burn patients and post-operative patients of surgical wards. Hence an epidemiological study of these surgical wards was conducted to determine the source and amount of colonisation of F. aeruginosa in these wards.

A total of 640 samples consisting of skin, nails, no se and threat suchs to detect F, deruginosa carriers from surgical ward staff and patients, suchs from walls, floors, beds, equipments and furnitures of these wards to detect environmental contamination with F, deruginosa and 1% Dettor nutrient agar plates were exposed to air for 1 hour at different sites of these wards to detect serial contamination with F, deruginosa were collected. Cotton wool swabs soaked in gluocae broth were used for swab collection and 1% DNA was used as a selective medium for isolation of F, deruginosa. Eight hundred and forty epide miological samples from surgical wards where incidence of F, deruginosa, isolation was noted to be higher, yielded twe mty F, agruginosa strains.

In 1979 M.R.B. Keighley (29) conducted a prospective randomized trial in 93 patients undergoing elective colorectal operations were given a short

prophylactic course of meteronidancle and kanemycin orally or systemically. Post-operative sepsis occured in only 3 (6.5%) of those given antimicrobials systemically compered with 17 (3.6%) of those given oral prophylaxis.

15 of the 17 infections in patients who received antimicrobials orally were due to kanamycin resistant bacteria present in the colon at operation. Sectorial over-growth of steph, aureus was recorded in 6 of the patients who received oral therapy. These results indicated that oral administration of prophylactic antimicrobials in colon surgery should be avoided because of risk of bacterial resistance, superinfection and antibiotic associated pseudomembraneous colitis. Systemic pre-operative antimicrobials prophylaxis is safer and more effective.

In 1980 T.E. Sucknall (10) studied the effect of local wound infection upon wound healing. It was an experimental study. Local infection was introduced into rat abdominal wounds using a 10⁸ bacterise/mi inoculum. Three groups of infection were used. Staphylococcus sureus, pseudomonas aeruginosa and a combination group of E. coli and proteus mirabilis. Infection was shown to delay healing as judged by burnting tests. Fibroblast proliferation was depressed at wound edges but there was an increase in the total amount of hydroxyproline present. Small vessels engiogenesis was increased in areas of abscess formation but larger wessels were commonly blocked by

permanent solution, but later it has become the nightmare of the surgeons. Many considered and still now consider antibiotics as 'wonder drugs' which could cover their lapses in surgical techniques and asepsis. Over reliance on antibiotics led to their extensive and often indiscriminate use resulting into development of resistance by various organisms. Similarly too much reliance was placed on conventional dressings. In 1981, Lt. Col. T.K. Cherian(12) studied prospectively 408 surgical cases to see whether the use of prophylactic antibiotics and conventional dressings could be dispensed within the majority of clean and clean contaminated cases.

clean contaminated cases operated by Lt. Col. T.K.Cherian(12) during 5 year period were included in this series. In group I of clean cases there were 226 patients whereas in group II, of the clean contaminated cases there were 182 patients in whom either the gastro-intestinal tract or the biliary tract was opened. In this series of 400 cases, 61 cases (14.95%) developed wound infection, out of which 26 occured in clean group (11.50%) and 35 in clean contaminated group (19.23%). It was observed that the infection rates were higher when prophylactic antibiotics and conventional dressings were used. The commonest organism found in the series was staph, pyogenus.

The others were C. coli and pseudomonas pyocyaneus.
All these were resistant to majority of antibiotics
commonly used.

It is frequently said and with some truth that you cannot begin to investigate something until you can measure it. There is no doubt, for instance, that the clinical study of accidental trauma has greatly depended on the various attempts to grade its severity (21, 22). The introduction of the injury severity and care system by Baker et al (3) represented a big advance for detailed studies on many aspects of troums (11, 49, 56) them became possible. Many of pathophysiological and metabolic consequences of sepsis, particularly that in the abdomen and thorax resemble those after accidental trauma. Further work is being hindered by the lack of a convenient grading system since at present it is difficult to compare findings in different patients or different centres. The most developed system for classifying patients with sepsis was that devised by Sigel et al (1979) (45), using a number of cardiovescular parameters, not all of which are easily obtained. Despite the value of this method something simpler was needed which could be applied at a district general hospital level and yet which could still be more sensitive than a simple 0-10 scale.

E.A. Elebute & H.B. Stoner (17) in 1983 tried to develop a grading system which met these requirements.

In this system four classes chosen for grading the severity of sepsis were local effects of sepsis, pyrexis, secondary effects of sepsis and laboratory data. This grading system was applied to 15 patients. Five of these patients died and in 4 of them the highest score exceeded 20 whereas in the patients who survived, the score only rose above 20 in one.

method for accoring the severity of a septic process, based on deteriorated functions in seven key organ systems of the body. The scoring system was numeric and recognized that the risk to a patient rises geometrically as organ system functions deteriorate step by step. The scoring system was validated by reviewing the clinical course of 30 patients with sepsis. Prognosis and hospital stay correlated well with individual scores. The scoring system offered more accurate comparison in clinical studies of infected patients and helped follow-up a patient with sepsis more accurately. To arrive at a score for a given patient with sepsis, each of several vital organ system was assigned a numeric value based on the physiological and clinical data available.

Each of seven systems (lung, kidney, coagulation, cardiovescular, liver, gastro-intestinal tract, neurologic) was graded in 36 patients with severe sepsis and assigned a number from one to five, according to the severity of

the dysfunction in the organ system. They applied the scoring system prospectively to evaluate its prognostic accuracy and utility. Each patient had a septic source that could be improved by drainage or debridement thus was defined as having surgical sepsis. The source of infection was shown in each case at operation or autopay. Also each patient had one or more failed organ systems. Any patient accring less than 6 with the system was not included in the study. Scores were calculated by equaring the assigned values given to each of the three organ systems with the most severe dysfunction and adding these three highest scores to arrive at a final rating. Thus if a patient was observed to have septic shock requiring veso-pressins, required mechanical support for respiration and had a serum creatining level of 2.9 mg/100 ml, the sensis severity score (\$55) would be calculated as $4^2 + 4^2 + 2^2$ for a total score of 36 (). The survival of a patient was compared with the individual 865 at the time of surgical effort. The mean 555 in the patient who died was 49 and that for survivors 29, indicating that the SSS correlated with the prognosis for a given patient. when the length of hospital stay for survivors was compared with their 555s, high scores were noted for petients with loncer hospital stay.

The system was found to be efficient, with rating of a new patient requiring only an average of five minutes

for a physician familiar with the system who used the scoring system. An 555 value of 6 or greater, however seemed to signal a level of severity that warranted supervision in an intensive care unit.

surgical practice revolutionized the scope of surgery.

Since then many advances that have been made in asepsis and antisepsis have considerably reduced the hazards of infection of surgical operations. Despite all these advances, wound infection still remains one of the important causes of post-operative morbidity in the hospital. In 1985, S.S. Kowli & R.A. Shalerao (30) conducted a study to find out the post-operative infection rate in Seth G.S. Medical College & K.E.M. Mospital, Parel, sombay, the probable source of infection, the type of becteria most commonly involved, their antibiotic sensitivity pattern and other common factors contributing to post-operative sepsis.

During the 3 year period from June 1982 to May 1985, a total of 1034 cases were operated upon at the K.E.M. Hospital and 85 cases were operated upon at the Community Health Centre, Malevan, Bombay by a single surgical unit. Details of patients age, sex, diagnosis, nature of operation, pre-operative stay, post-operative stay, duration of operation & post-operative course were

carefully noted. A wound was considered to be infected either when pus was present or sicro-organisms were grown in conjunction with signs of inflammation.

One hundred fifty cames studied at K.E.M. Mospital were divided into elective (n = 129) and emergency (n = 21) cases. The elective cases were further classified into routine major (n = 24) and routine minor (n = 35). Each patient was studied for pre-operative, intra-operative and post-operative bacteriological investigations. Freoperatively, masal throat and rectal awabs and urine cultures were taken. During operation, air sampling of operation theatre was done by sedimentation plate technique. Incision site swab was taken from suboutaneous area of the wound just before the final skin closure. Fost-operatively introvenous catheter tips, urine catheter tips were evaluated for their becteriology in all patients. In the case which showed clinical evidence of post-operative infection, wound swabs, peritoneal fluid, pus and blood were also studied for their bacteriology.

Regults - It was noted that infection rates were not related to the sex of the patient. The infection rate was greater in patients beyond 50 years (21 out of 28) compared to that in the patients _50 years of age (49 out of 122).

- Pre-operative stay beyond 7 days in the hospital increased the post-operative infection rate by a multiple of 4.

- The infection rates for clean and unclean cases were 44 out of 117 (37.6%) and 10 out of 12 (83.4%) respectively.
- Fost operative wound infection was found in 70 out of 150 patients and 85 wound swabs were taken for study Out of 85 swabs, only a single gram positive organism (staph sureus & albus) was grown in 9 swabs. Single gram negative organism (E. coli, klabsiella, proteus pseudomonas) accounted for 14 swabs (17%).

In this study the infection rate was directly proportional to the pre-operative hospital stay and duration of operation. The infection rate was 37.6% for clear cases and 63.4% for unclear cases. Bacillus subtiles was the predominent promism in the theatre environment. The overall infection rate at K.E.H. Hospital, was 42%. 11.4% for routine minor, 46.3% for routine major and 76.2% for emergency dases. At KEMM 69% of the infecting organism were from endogenous source and all such organisms were gram negative bacilli. Gram negative serobic bacilli and gram positive serobic cocci were isolated in 45.6% & 10% post-operative wound swabs respectively. At KEMM 23% anaerobes along with gram negative bacilli - Bacteroid apecies accounting for 49.6% - were also isolated in post-operative wound awabs. Gentamicia was the antibiotic to which the isolated acrobes were most sensitive - 98% at

KS MM. No clean case died of mixed gram negative becilli and amerobic infection.

bespite the advances made in pre-operative assepsia, antiseptic techniques and prophylactic antibiotics, the incidence of post-operative wound infection is quite common. In 1985, Khan (26) et al conducted a study to see the problem of post-operative wound infection in reference to verious factors directly or indirectly related in wound infection in J.N. Medical College Hospital, Aligarh, U.P.

A total of 456 patients admitted under a single surgical unit formed the besis of study. Fatients operated for infected conditions were excluded and only those with clean wounds were studied. Each patient was followed up from the time of admission till the discharge from the hospital and then upto 2 months after discharge. When infection was suspected, a sterile cotton swab was dipped directly into the infected wound and a primary culture was done. If the culture turned out to be positive then the antibiotic sensitivity was also performed using the standard perfusion method.

Out of 450 patients studied, 359 (79.8%) had their wounds healed by first intention, 91 cases developed post-operative clinical as well as besteriological wound sepais.

The infection rate was also higher in females (30 out of 114 - 27.3%) as compared to 61 out of 336 males (18.1%). The

highest infection rate was observed in simple mastectomies and lowest in hermiorrhaphies and lumbar sympathectomies. The infection rate was higher in cases where drains were used (63 out of 209 cases - 30.1%) as compared to 28 out of 241 - 11.6%) where drain was not used. Pre-operative hospital stay showed no relation to the post-operative wound infection. Various predisposing factors responsible for post-operative wound infection were amagmia, malignancy and remote infections. Diabetes, dehydration, infected urine and previous admissions/operation did not contribute at all to the infection.

A total of 79 cultures were examined for the presence of micro-organisms. Of these, 43 (54.4%) showed staphylococci, 15 (18.9%) showed E. coli, 11 showed pseudomonas, 19 showed proteus, one showed Klebsiella and one showed streptococcus haemolyticus.

Although lot of work was done in exogenous sources, only a few reports of endogenous (self infection) wound infection and that too due to Staph, sureus associated with skin carriage were available. Self infection did not seem to play an important role in infection caused due to Pseudomones seruginosa. However, role of auto-infection in the etiology of wound infection due to other infecting organisms was not been thoroughly investigated. A study was therefore carried out by Asbok Kumar (32) in A.I.E.M.S., New Delhi in 1985, to determine the role of auto-infection

in the causation of surgical wound infection. Swabs from nose, throat, skin and high rectal swabs were taken 12 - 24 hours prior to surgery. Patients included in this study were divided into different groups - clean, clean conteminated and dirty wounds. Wound swabs, stitch or a piece of drain was obtained in the post-operative period at the time of shortening the drain and on 3rd, 5th & 7th day. Out of 100 indoor patients who underwent elective surgery, 64 were found to be carrier of a single/multiple pethogenic organisms at one or more sites pre-operatively. Postoperatively, 20 patients developed wound infection, while pathogenic organisms were found to colonize wounds of 14 more patients. Fifteen carriers developed wound infections/ colonisation in the post-operative period due to the same organism as carried by them during the pre-operative wound. A total of 5 patients developed wound infection due to Staph, aureus in the post-operative period. Klebsiella pneumonae was isolated from the wounds of 8 patients who developed wound infection. In total auto-infection occured in 2 of the 20 patients who developed wound infection in post-operative period. One of these was One to Staph, aureus and other due to proteus. Autoinfection therefore plays a minor role, if at all, in the etiology of wound infection.

Progress in the study of sepsis had been hampered by the lack of a suitable system for grading its severity.

Systems suggested for acoring sepsis have been based either on its systemic effects (APACHE II) (27) or on a mixture of local and systemic variables (sepsis score) (17). In 1967, G.A. Fonling, H.A.F. Dudley and A.J.W. Sim (38) conducted a prospective study on 45 patients of sepsis and compared the local and systemic effects of sepsis in predicting survivel. The APACKE II (27) and sepsis scores were applied to patients with intra-abdominal sepsis of more than I day's duration to determine if local or systemic factors were more important in predicting survival. Of 45 patients studied, 14 died. The sepsis score for nonsurvivors (median 21.5, range 11-32) was significantly higher than for survivors (median 14, range 10 - 26). There was overlap between the two groups, such that on individual score had no predictive value. The local component of the sepsia score was not significantly increased in non-survivors but the systemic component was. The APACHE II score for non-survivors (median 24, range 15-38) was significantly higher then for survivors (median 12, range 3-21) and correctly identified 13 of the 14 fatalities. Both the systemic and non-systemic components (age and chronic disease) were significantly higher among the latter. The APACHE II was more effective than the sepsie ocore in predicting survival.

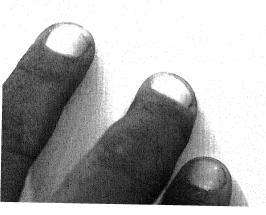
In 1988, Sohmen et el (7) conducted a prospective study in cases of ebdominal sepsis and applied APACHE II

acoring system (Acute Physiology and Chronic Health Evaluation). They correlated APACHE IX scores with mortality in 100 patients hospitalized for generalized peritonitis or abdominal abscess. Use of steroids was recorded because of suspicion that steroids increase mortality but slow the physiologic response to sepsia. They studied 51 males and 49 female patients. The mean age was 58.8 years. Thirty one patients died and a total of 129 episodes of abdominal sepsis occured. Mineteen patients received long term steroid therapy and a total of 25 patients received steroids at any time.

overall, the mean APACHE II score in 100 patients was 13.72 with a range from 0 to 36. The mean APACHE II score in patients who died was 18.9 compared with 11.4 in survivors. An increasing APACHE II score was associated with an increased likelihood of mortality. The mean APACHE II score of 12 patients receiving long term steroid therapy but who died was 17.5, compared with a mean APACHE II score of 13, in seven survivors receiving long term steroid therapy. Step-wise discriminant analysis goverhed that the APACHE II score and steroid use were significantly and independently associated with survival.

The role of anserobic bacteria in post-operative sepsis, is well known. In 1969 Thangan Menon (36) from

post-graduate Institute of Besic Medical Sciences, Madras conducted a study to find out the incidence of anaerobic in various post-operative infections and the antibody response in these patients using counter immuno-electrophoresis (CIEP) and agglutination tests.



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MATERIAL AND METHODS



MATERIAL AND METHODS

During one year period from May 90 to May 91 a total of 1000 cases were studied. These patients were admitted to M.L.B. Medical College, Jhansi, for any surgical interventions. Details of the patient's age, sex, diagnosis, nature of operation, post-operative stay and post-operative course were carefully noted.

when infection was noticed or suspected, a sterile cotton swab dipped directly into infected wound and sent for culture to identify infective organism. At the same time, scoring of sepsis was done by modified scoring system (E.A. Elebute & H.B. Stoner) (17). In this system four classes of attributes of sepsis were choosen. They were as follows -

- a) Local effects of sepsis,
- b) Pyrenia,
- c) Secondary effects of sepsis.
- d) Laboratory data,
- a) Scoring of local effects of tissue infection -
 - I. wound infection with purulent discharge/enterocutameous fintula.

		requiring only light dressing changed not more than once daily	2
	(11)	requiring to be dressed with a pack or dressing needing to be changed more than once daily or requiring application of a bag or requiring auction.	4
II.	Per1	tonitia	
	(1)	localised peritonites	2
	(11)	generalised paritonites	6
III.	, Ches	t infection :	
	(1)	Clinical or radiological signs of chest infection without productive cough	
	(11)	Clinical or radiological signs of chest infection with a cough producing purulent sputum	•
	(411)	Pull clinical manifestation of lober/bronchopmeumonia	•
		seated infection (subphrenic ess, pelvic abscess, empyems, acic, ecute or chronic osteomyelitis.	

b) Scoring of Pyremia :

Maximum daily temp.			
36.0 - 37.4°C			
37.5 - 38.4°C			1
36.5 - 39.0°C			2
7 39°c			3
∠ 36°C			
Minimum daily temp.	737.5°c		A444
if 2 or more to 38,40C in one d		****	*
If any rigors o	secur in a day		1

c) Scoring of secondary effects of sepsis :

while it was possible to define gradations of the local effects of tissue infections, pyremia, laboratory data, the attributes listed as secondary effects can not be so graded, therefore they were treated as existance criteria and given score if present.

L)	obvious jau	edice (in the	abse	nge	
	of establis	des par	atobil	iery		
	disc are					
11)	metabolic o	c140#1#	•			
	(e) Compens					
	(b) Pagempt	indete d				

iii) Renal failure	3
iv) Gross disturbance of mental orientation/level of consciousness	
(e.g. delirium, comma) or other	3
focal neurological manifestation	
of pysemio/septicaemia	
v) Bleeding diastheses (clinical basis)	
d) Scoring of Laboratory data:	
1) Nb level in the absence of	
obvious bleeding -	
(a) 7 - 10 gm%	1
그 이 그 사람들은 아내라 하는 그들이 많아 내려가 되는데 하이번에 살아 나가 되었다. 그 아이	
(b) <u>L</u> 7 gm/s	
11) Leucocyte count (10 ⁹ /L)	
(a) 12 - 30	*
(6) 7 30	2
(e) <u>(_</u> 25	
111) Platelet count (x10°/L)	
(a) 100 - 150	
(b) L 100	
iv) plasme albumin level (g/L)	
(a) 31 - 35	
(6) 25 - 30	
	1

v) Plasma total bilirubin level in the absence of clinically obvious jaundice

7 25 u mol/L

1

vi) Blood culture -

(a) Single positive culture

1

(b) Two or more positive culture separated by 24 hr.

3

patients in which sepsis was noted in the post-operative period upto the time of discharge. For scoring of sepsis each attribute was scored separately and sum of all scores gave an aggregate criterion which represented the total effect of septic state of the patient.

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A total of 1000 cases were studied from May 1990 to May 1991 in the Department of Surgery and Department of Obst. & Gynaecology in M.L.S. Medical College, Jhansi.

Attempt has been made to include all major cases operated during one year period, however, few cases could not be included because of incompleteness of study due to unevoidable reasons. In this study, we have excluded cases of fissure in ano, fistula in ano and haemorrhoidectomy because in previous such studies regarding hospital sepsis, these cases were not studied.

Each patient was followed-up from first postoperative day till the discharge from the hospital. Age and sex distribution of total cases is shown in Table 1 & 2.

TABLE_1
Distribution of the cases by age.

		fotal so.of	Fercentage
0 -	9	48	4.8
10 -	19	73	7.3
20 -	29	315	31.5
30 -	30		19.4
40 -	49	160	16.0
50 -	59		9.4
60 -	69	70	7.0
70 -	79		
7	80		1.4
enemen Onto) 1	1000	100.0

TABLE 1
Distribution of cases by sex.

***			. of studi			rcentag	•
Nales	Principal de la contraction de	kini estembro productiva kranovana da de	573	and the second and a second as the second	mer medikan kecama sapat sambah keraja propi k	57,3	
Pema Les			427			42.7	
7 ot a).			1000			100.0	

Total number of cases studied were divided into 3 groups - Clean, clean contaminated, and Infective (Table 3).

TABLE_2
Distribution of cases by type of surgery.

	of Surg		20.01		Percentage
Glear			\$4		
Clear	enten!	Loated			21.4
info	::1ve		16	1	10.1

Number of cases included in 3 groups depending upon the type of surgical procedure is shown in table 4, 5 & 6.

TABLE 4
Distribution of cases in "clean" group as per operative procedure.

Name of operation	Ho. of Cases	Percentag
Herniogrhophies	80	13.22
Cholecystectomies	46	7.60
lystrectomies	145	23.96
Caesarean sections	221	36,52
ophrectomies	20	3.30
Exploratory Laprotomies	2	0.33
Kastectomies	7	1.15
Cleft lip repair	11	1.81
Thyroidectomies		0,82
. sypathectomies	9	1,48
Excision of broast limp	12	1.90
Miscellane ous	47	7.76
random de la composition della	605	100,00

Distribution of cases in "clean contaminated" group as per operative procedure.

ype of operation	Eo.of Cases	Percentag
rostatectomie a	95	44.39
yelolithotomies	40	18.69
ephrectomies		1,96
ystolithotomies	38	17.75
reterolithotomies	9	4.18
ppendisectomies	28	13.00
respective and the second seco	in-insultan on a commissional distribution proportional metal-on-modernia	100.00



Distribution of cases in "Infective" group as per operative procedure.

Name of operation	No.of Cases	Percontage
nteric perforation	39	21.54
Intestinal obstruction	62	34.25
Retopic pregnancy	2	1.10
Intussusception	•	2,20
Gestric perforation	1	0.55
betructed Hernia		4.97
Paecal fistula		0.55
Stab wound abdomen	12	6.62
Duodenal perforation	6	3.31
Jejunel perforation	•	3,31
igmoid volvulus	18	6.62
Bugst liver abecess	*	0.55
Ac. Puncreelitie		0.55
Ischaemic colitis		3.31
Gun shot wound abdomen	10	5.52
Appendicular perforetion		4.97
anatana ang magamana ana anatana ang manatana ang manatana ang manatana ang manatana ang manatana ang manatana Porto de L	161	100.00



Out of 1000 cases studied, 96 cases developed clinical as well as bacteriological vound sepsis (Table 7).

TABLE 1

Gverall Infection rate.

Total		Anthonogallin and the delighted line.	No.of	And the second s	Fercentage
Call De D			infed	erdinaktik ediler riku ojtaj-cegs	enter en en distribuir de la companya de la company
3 (000				9.6

besteriological wound sepsis. In one case pus culture taken from infected wound was sterile. In 90 cases, single besterium was responsible for causing sepsis while in remaining cases more than one besterium namely Riebsiello, F.coli, Steph, sureus and proteus were responsible for causing sepsis (Table 8).

Name of bacterie Ho. of cases	Percentege
Staph. aureus 40	41.67
Klebsiella 20	20.83
r. coli	19.79
Proteus 7	7,29
Interobactor 4	4.17
Mixed culture 5	5.21
Sterile culture 1	1.00
Intel 96	100,00

For scoring of post-operative wound sepsis grading system of F.A. Flebute (17) was applied to all 96 infected cases and highest sepsis score during the period of study was noted in all cases. Different score in these patients is shown in Table 9.

TABLE 2

11 g) 5000	ro		sepais	#0.0f CADES	Percentage
0	60			3.9	19.79
5	466			35	36.43
9	alle	13		39	40,62
13	****	3.6		3	3.12
				and the second s	100,00

For observation of morbidity, we considered total post-operative stay in the hospital (Table 10).



TABLE_10

Overall morbidity.

Hospital stay			No.	No. of cases) excentage		
4	10	daya						86.8	
7	10	days			132			13.2	
					1000		e digit karinggan kangpulangan salahat ng pina si terbelah digit kangpulan Salahat ng pina salahat ng pinasa ng pinasa sal Salahat ng pinasa salahat ng pinasa salahat ng pinasa salahat ng pinasa ng pinasa ng pinasa ng pinasa ng pinas	100.0	

In our study, out of 1000 cases, 6 patients died. Out of 6, one patient was from clean group and rest of 5 were from infective group (Table 11).

TABLE 11

Overall mortality.

Type of cases		 drawns	Percentage
Infected	. 96		5,20
Non-infected	- 904		0.11
2010)			entertainment in telegopologica et esta litteriori del contra entertainment del contra entertainment del contr

e = 6.38. ₽ <u>८</u>0.001

Correlations

In this study, when correlation of infection with different age groups was done, then it was found that infection rate was slightly higher in older age group as compared to children (Table 12).

TABLY 12
Infection rate in various age groups.

(years)		199	Total No. of cases	No.of cases infected	Percentage	
0	ingle	9	40	8	4.16	
10	400	19	73	8	10.95	
20	dillo	29	315	32	10.15	
00	100	39	294	1.	7.73	
10	elidh	49	160	37	10.62	
50	2003-	59	94	10	10.63	
50	400	69	70		7.14	
70	- Apple	79	32		12.50	
7		60	14		21,40	
ron			1000	<u>96</u>	9.6	

x2 = 3.61. d.f. = 6. p 70.70



Infection rate was slightly more common in males as compared with females (Table 13).

TARLF 13
Infection rate by sex.

Ro.of cases	Magain - Takin madisakania- Asi Magain		of Coses Cooted	restage
Males	- 573		56	9.77
Penales	- 427		40	9.36
Total	1636		34	9.6
$x^2 = 0.05$,	d.f. = 1	. 2 70.80		

As far as type of surgery was concerned, infection rate was highest in infective group and lowest in clean group (Table 14).

TABLE_14
Infection rate in various groups of surgery.

	studied i	of Gases niected	
Clean	605	35	5.78
Clean conteminated	314	31	9.81
Infective	101	40	22.00
rotal	1000	96	9,6

In clean group of surgery, maximum infection rate was observed in mastectomies and lowest in herniorrhaphies (Table 15).

TABLE 18
Infection rate in clean group.

Type of operation	No.9f cases studied	No. of cases infected	Perce-
Hernierrhaphies	80	2	2,50
Cholecystectomies	46	3	4,34
dystrectomies	148	12	8.27
Caesarean section	221	3.4	6,33
Ophrectomies	20	•	***
exploratory laprotomies	2	within-	
Mastectomies	7		26,57
Cleft up Repair	11	- 100p	- with
Thyroidectomies		AME	
L. Sympathectomies			22,22
Excision of breest lump	13		
Miscelleneous	47	1	2.12
rotal			5.70



In clean contaminated group, highest infection rate was observed in nephrectomies and lowest in ureterolithotomies (Table 16).

TABLE 16

Infection rate in clean contaminated group.

Type of operation	No. of cases studied	No. of cases infected	Percentage
Frostatectomies	95	13	13,60
Pyelolithotomies	40	4	10.00
Sephrectomies	4	1	25.00
Cystolithotomies	36	3	7,89
Ureterolithotomies	9		
Appendisectomies	20		
?otel	214		9,81



In infective group, highest infection was observed in feecal fistule repair and lowest in intestinal obstruction (Table 17).

Infection rate in infective group.

Type of operation	No.of cases atualed	No.of cases infected	
Enteric perforation	39	3.3	28.20
Int. obstruction	62	11	17.74
Fetople pregnancy	3		
Intussusception			
Gastric perforation	4	•	
Obstructed Hernia	9		11.11
Yaccal fistula	3	1	100.00
Stab wound abdomen	12	***************************************	16.66
Duodenal perforation	6		66.66
Jejunal perforation		**	
Sigmoid volvulus	12	4	33,33
Breast liver abscess			190.00
Ac. pencrealitis			•
Ischeemic colitis			
Gun shot wound abdomen	10		40,00
Appendicular perforation			22,23
rotal	181	40	22.00

when analysis of scoring in relation to type of surgery was done, by dividing all infected patients into two groups with highest sepsis score 0-8 and 9-16, maximum number of patients were from infective group with 9-16 scoring (Table 18).

TABLE 18
Distribution of scoring by type of surgery.

Highest sepsis score	Clean	Type of surgery Clean conteminated	Infective	Total
0 - 8	28		22	54
9 - 16	10	14	10	42
Total	25		40	

we analysed the post-operative hospital stay in relation to sepsis scoring and it was statistically insignificant (Table 19).



TABLE 19
Distribution of scoring by hospital stay.

iighest Ppais Kore	2.232 2.252252252252252252252.	999788199 had	7 20	
) * 8		36	10	. 54
16	2	30	10	43
otal	retori etitaminen indelinina, rin etilehinya, andereta angantu.	**************************************	20	36

 $x^2 = 2.65$, a.f. = 2, y = 70.20

when overall mortality was analysed in relation to sepsis scoring, it was found to be little more in patients with sepsis score 0-8 as compared to patients of sepsis score 9-16 (Table 20).

TABLE_20
Overall mortality by sepsis score.

Highest sepais acore		No. of deaths	Fercentage
0 - 0		*	5.55
9 16	42		4.76
lotal	94		5,20

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DISCUSSION

CHARLES CARRESCE CONTRACTOR CONTRACTOR



DISCUSS FOR

Post-operative wound infection is designated to one of the three categories.

- 1. Inapparent (infection present without disease).
- 2. On admission (infection present on admission).
- Hospital acquired (noscommial) one that develops within the hospital or is produced by micro-organisms acquired during hospitalization (8).

Organisms that cause nosocomial infection come from either endogenous or emogenous sources. Endogenous infections are caused by patient's own flora whereas the exogenous infections result from transmission of organisms from a source other than the patient.

The post-operative wound infection rate as reported by various workers in the literature warks from 1.0% to as high as 55.6% (2, 5, 25, 53). Fublic Health Laboratogies service (37) reported sepsis rate in different hospitals of England 6 Hales undertaking general surgery 4.7 to 21.6%. Laurence 5. Cohen (13) reported 16% post-operative infection rate in his study while John 5.5. Stewart (46) reported 1.8% post-operative wound sepsis rate. In 1964, Committee on trauma (14) published a report on post-operative wound infection and it varied from 3 - 11% in different hospitals. 5.5. Kowli et al (30) reported 42% post-operative infection rate, while M.A. Khan reported it 20.2%.

In present study the overall incidence of postoperative wound infection was 9.6%, which is fairly compatible with previous studies.

The post-operative wound infection rate depends upon large number of factors like longer the pre-operative stay greater was the incidence of post-operative wound infection shown by many authors (30, 37, 40, 57). Longer the duration of operation, greater the incidence of post-operative wound infection shown by wasek, Venkataraman & Fublic Health Laboratories report (37, 54, 55). In contrast to these, Show et al (43) reported that post-operative wound sepsis is not dependent on the duration of operation and stated that different operations had their own infection rates decided mainly by the endogenous factors. Howe (24) suggested that any breach of asepsis in the operation theatre is responsible for high infection rate.

Rao, Marsha, Stewart & Douglas (40, 46) observed lowest infection rate in cases kept first in the operation list. Endogenous micro-organisms were suggested by Kimmelman et al (28) and Story (52) as a cause of postoperative wound infection. However, our study was not
aimed to see the effects of all above factors, hence
they have not been worked out.

In our study post-operative wound infection rate was slightly higher in males as compared with females. Out of 573 males, 56 (9.77%) developed post-operative wound infection and 40 females out of 427 (9.36%) developed infection. Nowever, this difference was found to be statistically insignificant (P 7 0.80). Cohen et al (13) reported the same findings while others have reported higher infection rate in females in their studies (9, 14, 33, 37).

The post-operative infection rate was apparently higher (21.4%) in older age group (7 80 year) in our study. However, this was again found to be statistically insignificant (P 7 0.70). So in our study, age of the patient had no bearing on the post-operative wound infection. Brune (9) and Lidwell (33) have also considered age as an independent factor. While some worker (14, 37) have reported higher infection rate in older age group.

Infection rate was highest in infective group (22%) and lowest in clean group (5.78%). High insection rate in infective group was found to be statistically significant (P < 0.001). Similar findings have been reported by other workers also (39, 12, 30).

The post-operative wound infection was highest in simple mastectomies and lumber sympathectomies and lowest in herniorrhophies. Increased rate of infection in mastectomies and lumber sympathectomies apart from other reasons could be due to use of drains in these operations. Drainage provides an outlet for collected serum and blood and prevents hermatoms formation and thus it may diminish the risk of wound infection, but it is also true that drainage communicates the tissues with the exterior for a longer period and may act as a pathway for pathogenic becteria thereby increasing the risk of infection.

Lidwell (33) and Cohen (23) et al have reported a higher incidence of post-operative sepsis in drained wounds.

In our study staphylococci (41.67%) were mainly responsible for post-operative wound sepsie. Agrawal (2), Kumar (39) and others (12, 13, 23, 40, 44, 54, 55) have quoted a high staphylococcal wound infection (49.3 to 62%). Subrameniam et al (53) however reported 70% gram negative bacilli and 30% gram positive cocci from wound infection. Show et al (43) reported that 72,3% post-operative wound infections were due to staph, aureus, Beasley et al (6) have reported 53% mixed infection while Sten et al (48) have reported two thirds of intraperitoneal infections to be due to mixed serobes and anserobes. Mehta et al (35) have reported Elebsiella as predominant serobe in perforative peritonitis. There are a number of reporte

saying that in recent years, gram negative bacteria have supplanted gram positive cocci as a cause of the majority of local wound infection (4, 10, 20, 57). However, in our study gram negative bacteria were found in 52% cases.

grading system of E.A. Elebate et al (17) was applied to 96 cases. Highest sepsis score in our study was 16, while Elebate et al (17) had reported it 20 in their study. Lawrence E. Stevens (47) developed a method for scoring the severity of a septic process based on deteriorated functions in seven key organ systems of the body and the mean sepsis severity score in his study was 29 im survivors and 49 who died. Bohman et al (7) applied AFACHE II (27) scoring system in cases of abdominal sepsis. The mean AFACHE II score in patients who died was 18.9 compared with 11.4 in survivors.

in all infected cases when analysis of highest sepsis score during hospital stay and type of surgery was done it was found that highest sepsis score was significantly higher in infective group of surgery (r \(_0.05 \)). However, duration of post-operative stay was insignificant (r \(_70.20 \)) in relation to highest sepsis score. So post-operative hospital stay may be increased or decreased, depending upon other factors.

As far as mortality was concerned, 6 patients died in our study. Out of 6, one patient was from clean group, a case of cholecystectomy died on second post-operative day, cause of death was more likely myocardial ischaemia, but death was not due to sepsis. Seat 5 patients were from infective group. Highest sepsis score was 16 in two patients, out of five who died and in rest of three, it was ranging from 5 to 6. High mortality in infective group was found to be statistically significant (P < 0.001). While overall mortality by sepsis score was insignificant (P 7 0.80). In the study of N.A. Elebate (17), five patients died out of 15 and in 4 of them, the highest sepsis score exceeded 20, whereas in the patients who survived the score only rose above 20 in one.

Injury severity score in that it tells the severity of sepsis at a particular time whereas a patient's injury severity score remains the same throughout his course. The sepsis score can thus be used to follow the progress of a patient. This method shows a possible, simple way of grading a patient's sepsis and it has been also found very useful in the work on the metabolic aspects of sepsis (50).

At this stage, the scores alloted to various features of sepsis are largely arbitrary although their order for a particular attribute, is probably correct.

Several comments can be made on the individual gradings. The range of temperature scored above 0 is outside the normal range of 36.9 ± 0.47°C (16) and the grading of the changes in temperature has been influenced by findings of Altmeier et al (1). The inclusion and rating of metabolic acidosis reflects the work of Mac Lean et al (34). Renal failure, mental disturbance and bleeding diasthesis have been given a maximum score of 3, but with more experience, it may be necessary to increase it. The rating of thrombocytopaemia is supported by data of Kregar et al (31). The range of the laboratory tests used has been deliberately kept to a minimum of those readily available. No attempt has been made to score 'septic shock' directly because of the difficulty of getting a precise definition that would be universally accepted.

large bodies of data should now be build up not only for thoraco-abdominal sepsis but also for sepsis in other situations such as multiple traums and burns. This would test the general validity of the system and allow more sophisticated methods (51) to be used to determine the best values for the scores. It would also enable one to see if it was necessary to score all the attributes listed above to get a meaningful score and whether the same system was equally useful for all purposes e.g. studying the effect of age on the responses to sepsis.

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CONCLUSION

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CONCLUSION

In the present study 1000 patients were followed from first post-operative day till the discharge from the hospital, to see the incidence of post-operative wound infection, type of bacteris causing infection and finally we tried to grade the severity of post-operative wound sepsis by modified scoring system of R.A. Elebute (17).

Total number of patients studied were divided into three groups according to type of surgery.

- Clean,
- Clean contaminated,
- Infective.

The conclusions derived were as follows -

- 1. The overall infection rate was 9.6%.
- 2. Stoph. sureus was responsible in 41.66% for postoperative wound sepsis, while in \$2% gram negative bacteria were isolated like Klabsiella, P. coli, proteus etc. and in \$2% mix culture was obtained.
- Higher post-operative infection rate in males and older age group was statistically insignificant.

- Infection rate was significantly higher in infective group.
- 5. Out of 96 infected cases, maximum highest sepsis score was 16 in only three patients, two of them expired.
- 6. Overall mortality in our study was 0.6%.

Thus present study shows overall infection gate 9.6%, Steph, sureus responsible for post-operative wound sepsis in 41.66% with maximum highest sepsis score 16 in three patients out of 96.



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